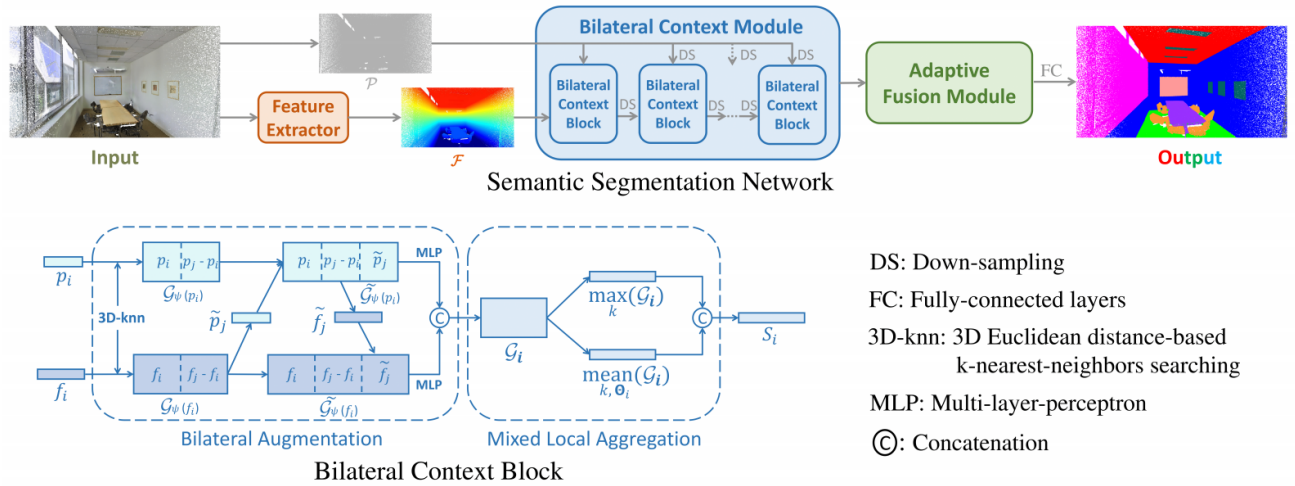

Figure 2: The details of our semantic segmentation network and the Bilateral Context Block (the annotations are consistent with the items in Sec. 3.1). Firstly, the Feature Extractor (Sec. 4.1) captures the preliminary semantic context $\mathcal{F}$ from the input data. Then, the Bilateral Context Module (*i.e.*, a series of the Bilateral Context Blocks) augments the local context of multiple point cloud resolutions. Generally, the Bilateral Context Block requires both semantic and geometric context as bilateral inputs. In particular, the first block inputs the preliminary $\mathcal{F}$ and the original 3D coordinates $\mathcal{P}$; while each of the others inputs its previous one's downsampled output and coordinates $\mathcal{P}$, as the semantic and geometric context respectively. Afterward, our Adaptive Fusion Module (Sec. 3.2) upsamples the Bilateral Context Blocks' outputs, then adaptively fuses them as an output feature map. Finally, we predict semantic labels for all points via fully-connected layers.

图 1: Bil_Aug_Adap_Fusion

分析:

- 随机采样，然后通过 local spatial encoding, Attentive Pooling 通过类似 ResNet 的结构组织起来，对特征进行聚合。(能够处理较大规模的数据)

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$$\mathcal{G}_\psi\left(p_i\right)=\left[p_i ; p_j-p_i\right]$$
$$\mathcal{G}_\psi\left(f_i\right)=\left[f_i ; f_j-f_i\right]$$
$$\tilde{p}_j=M\left(\mathcal{G}_\psi\left(f_i\right)\right)+p_j . \quad \tilde{p}_j \in \mathbb{R}^3$$
$$\tilde{\mathcal{G}}_\psi\left(p_i\right)=\left[p_i ; p_j-p_i ; \tilde{p}_j\right]$$
$$\tilde{f}_j=M\left(\tilde{\mathcal{G}}_\psi\left(p_i\right)\right)+f_j, \tilde{f}_j \in \mathbb{R}^d$$
$$\tilde{\mathcal{G}}_\psi\left(f_i\right)=\left[f_i ; f_j-f_i ; \tilde{f}_j\right] .$$
$$\mathcal{G}_i=\operatorname{con} \operatorname{cat}\left(M\left(\tilde{\mathcal{G}}_\varphi\left(p_i\right)\right), M\left(\tilde{\mathcal{G}}_\psi\left(f_i\right)\right)\right)$$
$$\mathcal{L}\left(p_i\right)=||\frac{1}{k} \sum_{j=1}^k \tilde{p}_j-p_i| |_2,$$
$$s_i=\operatorname{concat}\left(\max_k\left(\mathcal{G}_i\right), \operatorname{mean}_{k, \Theta_i}\left(\mathcal{G}_i\right)\right)$$

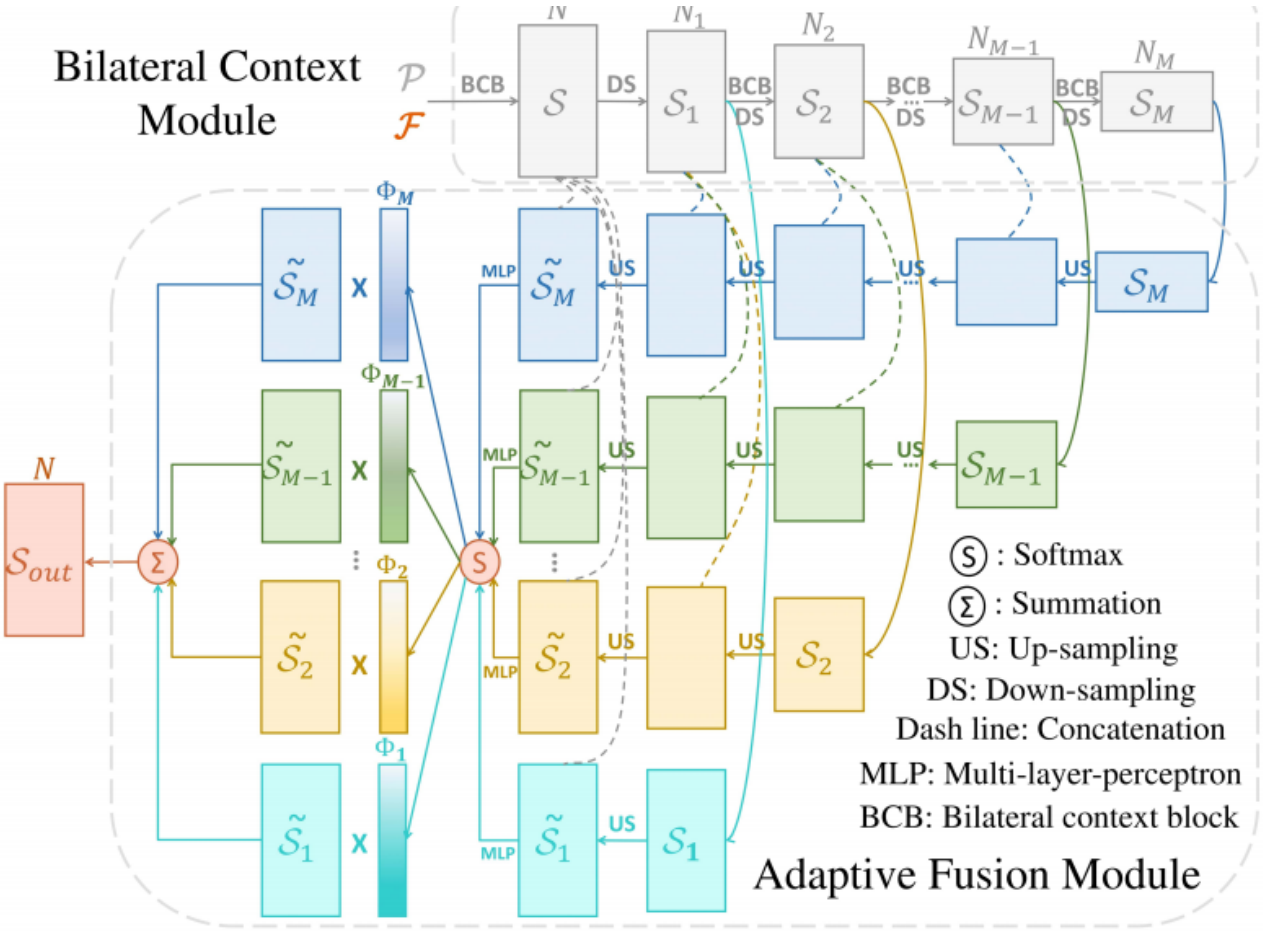

图 2: Adap_Fusion_Mod